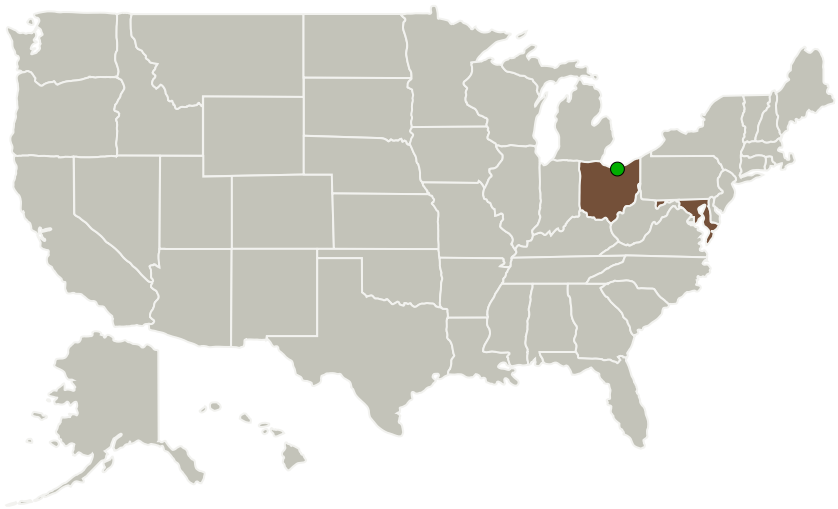
A Combined Health Estimation and Active Balancing Electronic System for the Life Enhancement of Batteries in Hybrid and/or All-Electric Propulsion Systems, Phase I

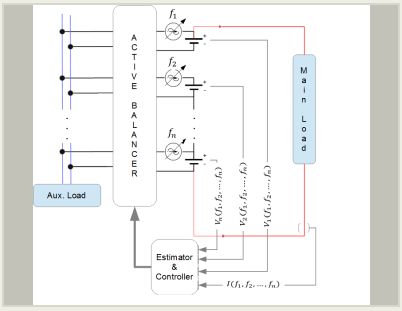
Completed Technology Project (2017 - 2017)

Project Introduction

NASA seeks intelligent monitoring for hybrid and/or all electric propulsion systems, and methods to significantly extend the life of electric aircraft propulsion energy sources and their safety. Active balancing is an attractive technique that can be used to increase battery pack life. If performed efficiently and accurately, active balancing can translate into longer battery life and more efficient battery utilization. Active balancers presently equalize either voltage or State of Charge (SOC) in a group of cells or super-cells in series. The more accurate in-operando SOC active balancers depend on on-line SOC estimation algorithms that are typically based on terminal voltage, current, and temperature. These algorithms (e.g., Coulomb counting, Kalman-based filter estimation, etc) accumulate errors and/or become unstable as a consequence of measurement errors, model simplifications, and the lack of an accurate battery parameter determination and tracking method, which is critical as the battery ages and/or operates under unforeseen conditions. To address this problem we propose an active balancing electronic system that can jointly balance the battery pack and measure battery health related parameters without additional hardware. We propose to use this efficient electronic system to demonstrate an improved active balancing system capable of battery life enhancement and safety operation.

Primary U.S. Work Locations and Key Partners





A Combined Health Estimation and Active Balancing Electronic System for the Life Enhancement of Batteries in Hybrid and/or All-Electric Propulsion Systems, Phase I Briefing Chart Image

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Small Business Innovation Research/Small Business Tech Transfer

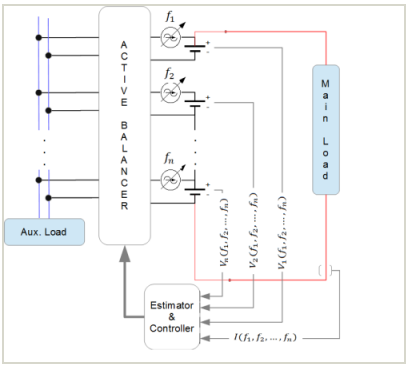
A Combined Health Estimation and Active Balancing Electronic System for the Life Enhancement of Batteries in Hybrid and/or All-Electric Propulsion Systems, Phase I

Completed Technology Project (2017 - 2017)

Organizations Performing Work	Role	Type	Location
X-wave Innovations	Lead Organization	Industry Women-Owned Small Business (WOSB)	Gaithersburg, Maryland
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Maryland	Ohio

Images



Briefing Chart Image
A Combined Health Estimation and Active Balancing Electronic System for the Life Enhancement of Batteries in Hybrid and/or All-Electric Propulsion Systems, Phase I Briefing Chart Image *(https://techport.nasa.gov/image/132604)*

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
X-wave Innovations

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

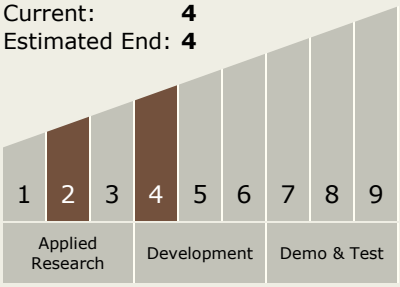
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Carlos Rentel

Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



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Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
  - TX03.2 Energy Storage
    - TX03.2.1 Electrochemical: Batteries